

# Exercise Solutions for Math 20

Equations in Quadratic Form and with Radicals and Absolute Values

Nile Jocson <novoseiversia@gmail.com>

November 9, 2024

# Contents

<b>1</b>	<b>Find the solution set of the following inequalities.</b>	<b>3</b>
1.1	$\frac{2x+1}{4} \leq \frac{2x}{3} + \frac{1}{6}$ . . . . .	3
1.2	$-2 < 5 + 3x < 20$ . . . . .	3
1.3	$\frac{x}{x-1} > -1$ . . . . .	3

# 1 Find the solution set of the following inequalities.

**1.1**  $\frac{2x+1}{4} \leq \frac{2x}{3} + \frac{1}{6}$

$\Rightarrow \frac{3(2x+1)}{12} \leq \frac{4(2x)}{12} + \frac{2}{12}$ $\Rightarrow \frac{6x+3}{12} \leq \frac{8x}{12} + \frac{2}{12}$ $\Rightarrow \frac{6x+3}{12} \leq \frac{8x+2}{12}$ $\Rightarrow 6x+3 \leq 8x+2$ $\Rightarrow 3-2 \leq 8x-6x$ $\Rightarrow 1 \leq 2x$ $\Rightarrow x \geq \frac{1}{2}$	LCM = 12
$\Rightarrow x \in [\frac{1}{2}, +\infty)$	Final answer. <span style="float: right;">■</span>

**1.2**  $-2 < 5 + 3x < 20$

$\Rightarrow -7 < 3x < 15$ $\Rightarrow -\frac{7}{3} < x < 5$	Solve for $x$ .
$\Rightarrow x \in (-\frac{7}{3}, 5)$	Final answer. <span style="float: right;">■</span>

**1.3**  $\frac{x}{x-1} > -1$

$\Rightarrow \frac{x}{x-1} + 1 > 0$ $\Rightarrow \frac{x}{x-1} + \frac{x-1}{x-1} > 0$ $\Rightarrow \frac{x+x-1}{x-1} > 0$ $\Rightarrow \frac{2x-1}{x-1} > 0$	Solve for $x$ .																
<div style="text-align: right;"><math>x = 1</math> is an undefined point.</div> <div style="text-align: right;">Create a table of signs.</div> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 15%;"></td> <td style="width: 20%;"><math>\frac{1}{2}</math></td> <td style="width: 20%;"><math>1</math></td> <td style="width: 45%;"></td> </tr> <tr> <td><math>2x - 1</math></td> <td><math>-</math></td> <td><math>+</math></td> <td><math>+</math></td> </tr> <tr> <td><math>x - 1</math></td> <td><math>-</math></td> <td><math>-</math></td> <td><math>+</math></td> </tr> <tr> <td><math>\frac{2x-1}{x-1}</math></td> <td><math>+</math></td> <td><math>-</math></td> <td><math>+</math></td> </tr> </table>			$\frac{1}{2}$	$1$		$2x - 1$	$-$	$+$	$+$	$x - 1$	$-$	$-$	$+$	$\frac{2x-1}{x-1}$	$+$	$-$	$+$
	$\frac{1}{2}$	$1$															
$2x - 1$	$-$	$+$	$+$														
$x - 1$	$-$	$-$	$+$														
$\frac{2x-1}{x-1}$	$+$	$-$	$+$														
$\Rightarrow x \in (-\infty, \frac{1}{2}) \cup (1, +\infty)$	Final answer. <span style="float: right;">■</span>																